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Distinguishing characters of *Niphargus gebhardti* Schellenberg, 1934 and *Niphargus molnari* Mehely, 1927 (Crustacea: Amphipoda): a clarification

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Abstract. Two endemic *Niphargus* species, *N. gebhardti* Schellenberg, 1934 and *N. molnari* Méhely, 1927 are known from two caves of the Mecsek Mts. (SW Hungary). The species are morphologically close to each other and differ only in few characters. Although, the original descriptions contain only scattered information and few drawings, more characters can be found in the additional literature. The purpose of this paper is to summarize the available distinguishing morphological characters and to provide sufficient drawings to ease the identification of *N. gebhardti* and *N. molnari*.

Keyword. Niphargidae, Mecsek Mts., caves, taxonomy

INTRODUCTION

The eyeless amphipod genus, *Niphargus* is one of the most neglected aquatic troglobiont taxon in Hungary so far. While globally, the number of the *Niphargus* species and subspecies has reached 300, taxonomic state of the few described Hungarian species remained uncertain. The checklist of Hungarian Malacostraca published by Muskó (2007) lists 15 *Niphargus* species and furthermore, gathers all records available in the literature, yet without commenting on their validity. In the last six decades elapsed since the descriptions, many new caves had been discovered without biospeleological examinations in the country. Therefore the data about the distributions and the species does not match the possibilities provided by the geological knowledge. Most of the descriptions provide insufficient morphological information and few drawings, and often even the type locality cannot be exactly identified. In most cases the holotypes are no more available in the type collections either because they were sent abroad and never returned or perished in the fire which ravaged the Hungarian Natural History Museum during the revolution in 1956. In such cases collecting new samples from the type locality can help to gather information about the species.

The morphology of niphargids is highly variable, therefore collecting and analyzing samples from the whole potential distribution area of the species can serve as a proof of the reliability of the characters.

Among the five known endemic *Niphargus* species of Hungary, two, *Niphargus gebhardti* Schellenberg, 1934 and *Niphargus molnari* Méhely, 1927 were described from the caves of the Mecsek Mts. *N. gebhardti* was first found in the pools formed by dripping water of the Abaligeti Cave. It was originally described as *Niphargus foreli gebhardti* by Schellenberg in 1934. The description contains two drawings about the telson and the propodus of the second gnathopod and little information about the pereopods, antennae, maxilliped and first maxilla (Schel-

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lenberg 1934). Later on, Schellenberg (1935) mentioned some additional data about the telson and the body size. The comparative study of Méhely (1941) contains a figure on the retinacles of the third pleopod and mentions the number of the teeth of the right lacinia mobilis.

N. molnari was described from the stream and pools of the Mánfai-kőlyuk Cave, and then it was also found in the stream of the Abaligeti Cave (Gebhardt 1963). The description is rather poor with only two drawings about the pereion segments and the epimeral plates. The species was originally described as *N. molnari* (Méhely 1927), and later on it was mentioned as a subspecies, *N. leopoliensis molnari* by Schellenberg (1933). In the paper of Schellenberg (1935) the species appeared again with its original name and taxonomic rank. A figure about the right lacinia mobilis can also be found in one of Méhely's papers (Méhely 1941). A single data about the number of the setae of the first maxilla's palpus was also given (Schellenberg 1935).

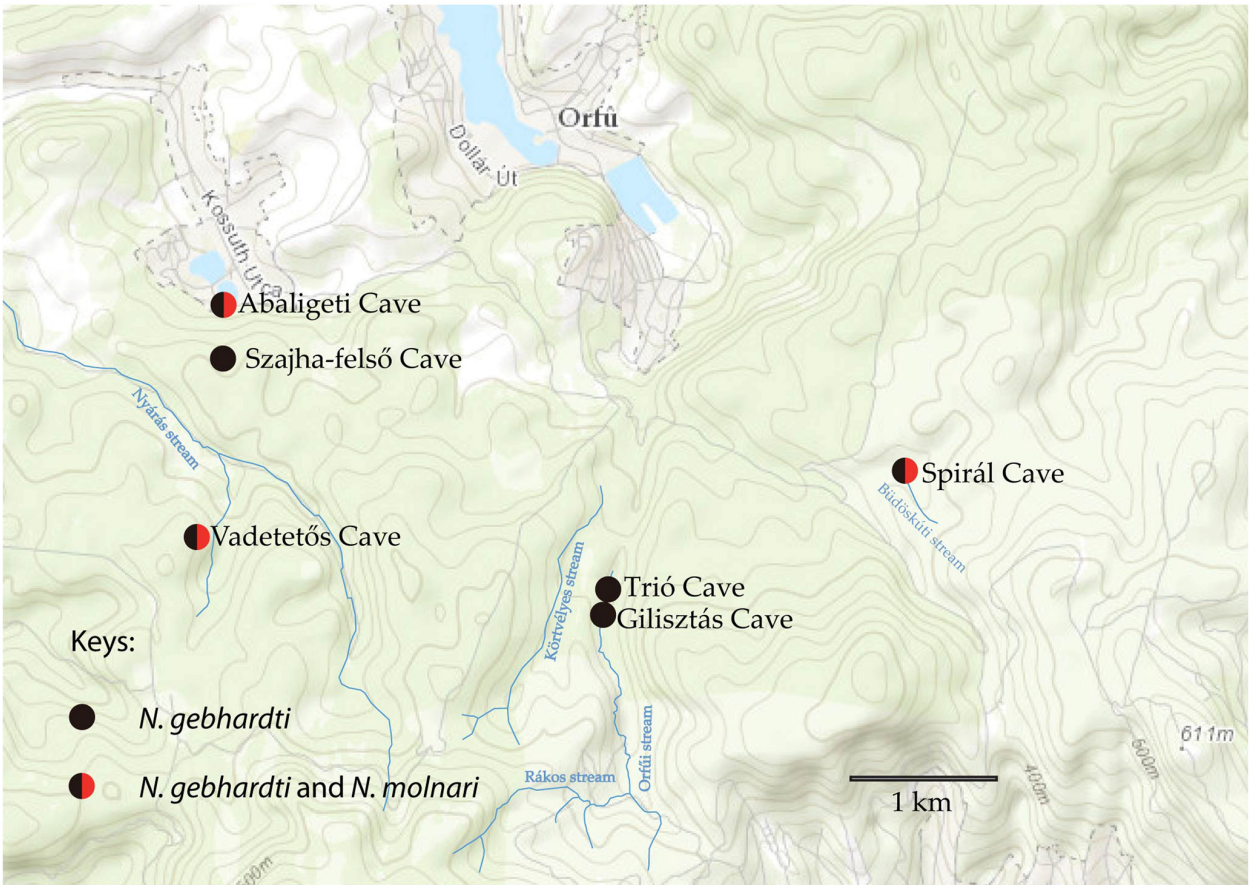


Figure 1. Locations of *N. gebhardti* and *N. molnari* in the six examined caves in Western-Mecsek

MATERIALS AND METHODS

Samples were collected between May 2010 and October 2011 in six caves from the Western–Mecsek (Figure 1.). Most of the caves examined were sinkholes with various length and vertical extensions (Table 1.). 40 individuals were collected by singling, fixed and stored in 96% ethanol. The material was identified by Cene Fišer and the authors. Preparation techniques were used after Fišer *et al*., (2009).

Specimens were cooked in 10% KOH solution, rinsed with HCl and washed in distilled water. Cleared exoskeletons were stained with chlorazol black in glycerol, and then dissected under a Leica MZ75 stereomicroscope. Two slides were made of each specimens, one contained the left side appendages and the mouth parts, while the other contained the whole body with the right side appendages. The slides were examined using a Leica DM 1000 light microscope. Drawings were made using a drawing tube.

Table 1. Names and basic data of the caves where the two *Niphargus* species were collected

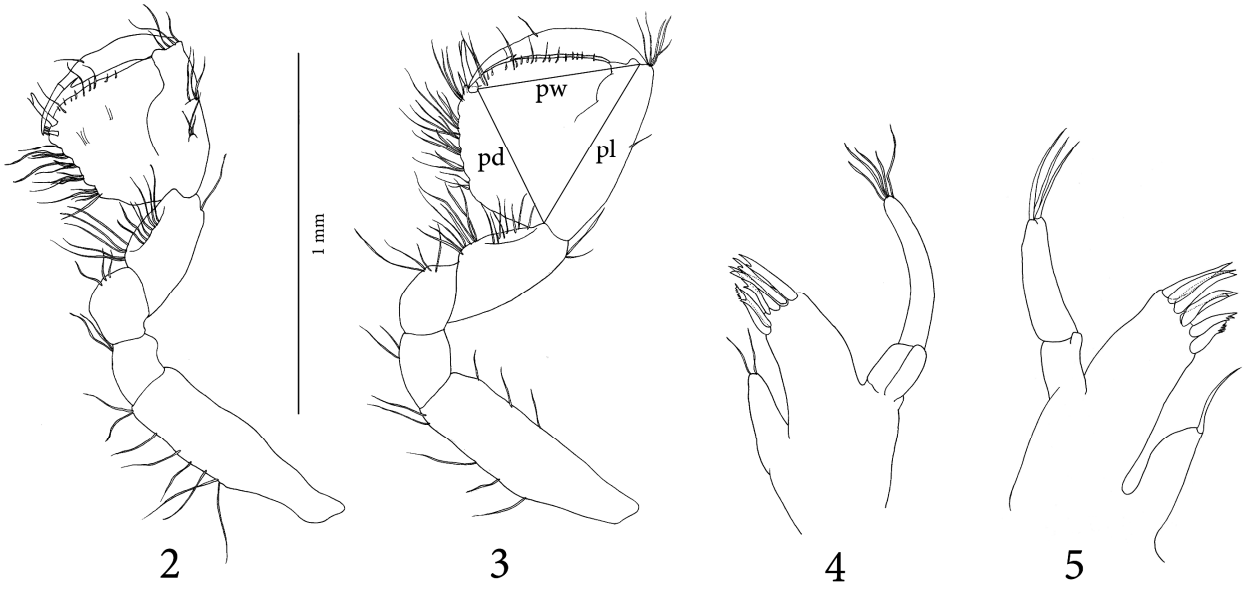
Name of cave	Type of cave	Cadastre number	Entrance's altitude above sea level (m)	Y (Decimal degree)	X (Decimal degree)	Length of cave (m)	Vertical extension of cave (m)
Abaligeti Cave	spring cave	4120–1	218,77	578056,43	88434,52	1712	48,7
Vadetetős Cave	sinkhole	4120–27	320,701	577872,84	86795,058	177	35
Trió Cave	sinkhole	4120–71	301,035	580722,26	86347,182	250	58
Gilisztás Cave	sinkhole	4120–70	307,704	580693,26	86268,727	134	51,1
Spirál Cave	sinkhole	4120–130	350,28	582719,93	87242,072	1000	86,4
Szajha-felső Cave	sinkhole	4120–16	283,508	578056,14	88041,665	98	40

Table 2. The seven distinguishing characters of *N. gebhardti* and *N. molnari*

Character	*N. gebhardti*	*N. molnari*
Body size	6–8 mm	9–10 mm
Number of setae on the palpus of maxilla I	5	3
Number of retinacles of pleopods	> 2 (3)	2
Shape of the propodus of gnathopod II, Ratio of propodus length (pl), propodus diagonal (pd) and propodus width (pw)	rectangular 26/24/26	elongated 30/24/29
Number of teeth of the lacinia mobilis on the right mandible	4–5	12–13
Shape of the telson Ratio of telson length (tl) and telson width (tw)	a bit longer then wide 11/10	significantly longer then wide 11/7
Shape of the epimeral plate 3	distoposterior angle is rounded	distoposterior angle is sharply inclined

RESULTS

N. gebhardti was collected in six caves (Abaligeti Cave, Vadetetős Cave, Szajha-felső Cave, Trió Cave, Spirál Cave, and Gilisztás Cave). *N. molnari* was not found in the type locality, however the species occurred in the Abaligeti Cave and in two other caves (Vadetetős Cave and Spirál Cave). In three out of the six caves both species occurred, but as it was suggested by Gebhardt (1963) coexistence in the same micro habitat within the same cave was never found. Examining all the literature related to the two species, seven distinguishing characters were gathered (Table 2, Figure 2–17). In case of the second gnathopod and the telson, measurement ratios were added according to the modern standard (Fišer *et al*. 2009). The seven characters proved stable in all the 23 specimens of *N. gebhardti* and all the 17 specimens of *N. molnari*, regardless the locality where the individuals were collected from. It seems that using combination of characters is a reliable method for distinguishing the two species.



Figures 2-5. 2 = gnathopod II, *N. gebhardti* (Abaligeti Cave), 3 = gnathopod II, *N. molnari* (Abaligeti Cave), pw = propodus width, pl = propodus length, pd = propodus diagonal, 4 = maxilla I, *N. gebhardti* (Szajha-felső Cave), 5 = maxilla I, *N. molnari* (Vadetetős Cave)

DISCUSSION

The new distributional data suggests that exploration of more caves for the two species would be required for determining the whole distribution area of *N. gebhardti* and *N. molnari* in the Mecsek Mts. The absence of *N. molnari* in the type locality can be due to the artificial changes of the hydrological system of the cave. The intrusive introduction of waterworks has led to the disappearance of endemic fauna elements and the appearance of distracted, urban habitat–dwelling species (Angyal 2012).

Because of the stability of the character combination, samples from other subterranean habitats of the Mecsek Mts. could also be dependably identified. However, redescription of both species is necessary to fulfil the modern *Niphargus* taxonomical requirements.

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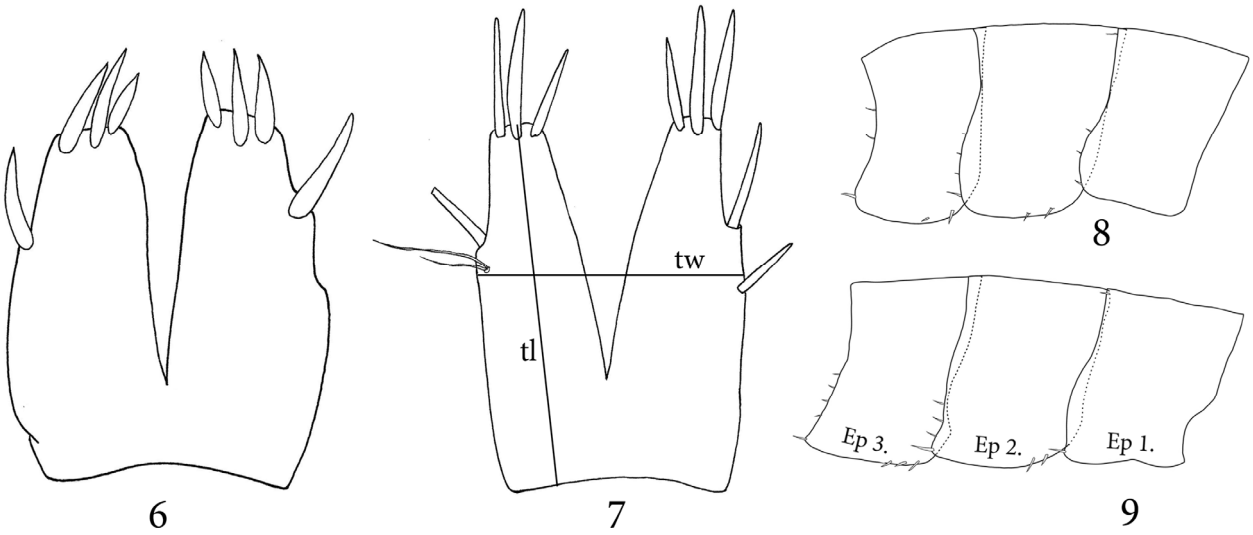
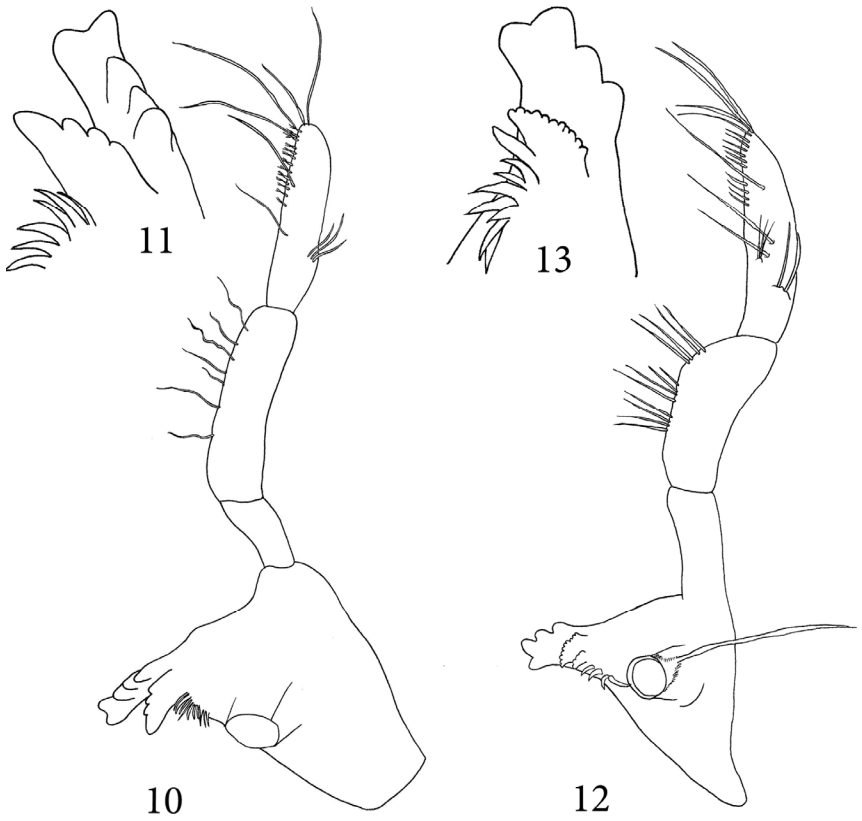
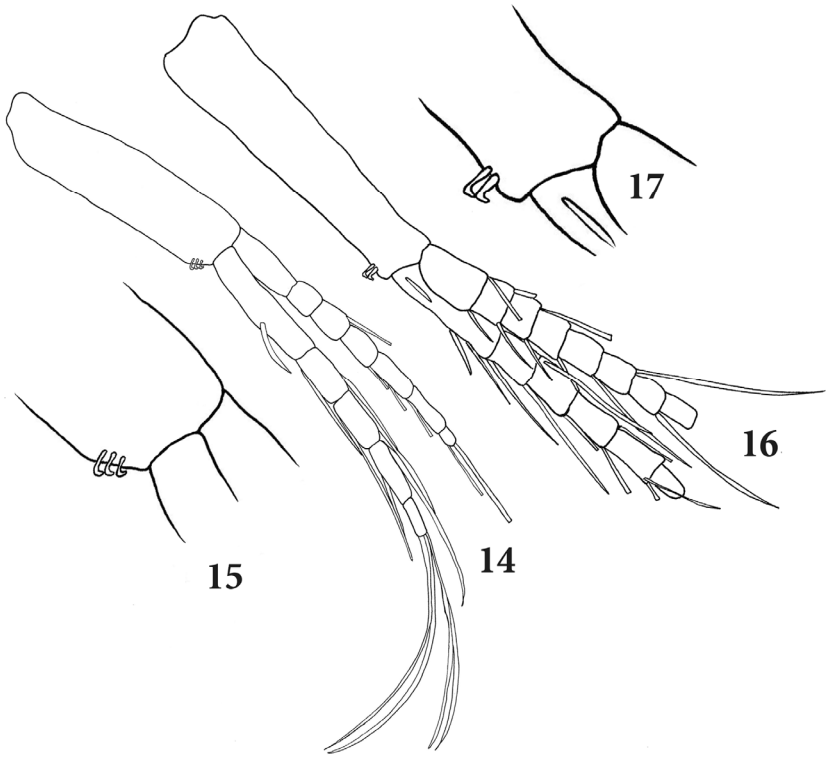


Figures 6-9. 6 = telson, *N. gebhardti* (Abaligeti Cave), 7 = telson, *N. molnari* (Abaligeti Cave), tl = telson length, tw = telson width, 8 = epimeral plate 1–3 *N. gebhardti* (Abaligeti Cave), 9 = epimeral plate 1–3 *N. molnari* (Abaligeti Cave)



Figures 10-13. 10 = right mandible, *N. gebhardti* (Abaligeti Cave), 11 = lacinia mobilis and incisor of the right mandible *N. gebhardti* (Abaligeti Cave), 12 = right mandible, *N. molnari* (Abaligeti Cave), 13 = lacinia mobilis and incisor of the right mandible*, N. molnari* (Abaligeti Cave)



Figures 14-17. 14 = pleopod II, *N. gebhardti* (Szajha-felső Cave), 15 = retinacles of pleopod II, *N. gebhardti* (Szajha-felső Cave),16 = pleopod II, *N. molnari* (Vadetetős Cave), 17 = retinacles of pleopod II, *N. molnari* (Vadetetős Cave)

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